GROUP A: PROJECT MANAGEMENT

A.1 TITLE AND APPROVAL SHEET

Quality Assurance Project Plan

North Ponil Restoration Project

Submitted by:

New Mexico Environment Department
Surface Water Quality Bureau

APPROVAL SIGNATURES

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A.2 TABLE OF CONTENTS

Table of Contents

List of Tables

List of Figures

ACRONYMS

BEHI	Bank Erosion Hazard Index
CWA	Cimarron Watershed Alliance
DO	Dissolved Oxygen
DQI	Data Quality Index
DQO	Data Quality Objectives
EPA	United States Environmental Protection Agency
GPS	Global Positioning System
HQCAL	High Quality Coldwater Aquatic Life
LWC	Low Water Crossing
NBS	Near Bank Stress
NIST	National Institute of Standards and Technology
NMED	New Mexico Environment Department
PSR	Philmont Scout Ranch
QA	Quality Assurance
QAO	Quality Assurance Officer
QAPP	Quality Assurance Project Plan
QAQC	Quality Assurance Quality Control
QC	Quality Control
SOP	Standard Operating Procedures
SWQB	Surface Water Quality Bureau
TMDL	Total Maximum Daily Load
TSS	Total Suspended Solids
WARSSS	Watershed Assessment of River Stability and Sediment Supply
WQPD	Water Quality Protection Division

A.3 DISTRIBUTION LIST

Table 1 contains the distribution list, project roles and responsibilities for this project. The Quality Assurance (QA) Officer will ensure that copies of this Quality Assurance Project Plan (QAPP) and any subsequent revisions are distributed to members who have signature authority to approve this QAPP. The Surface Water Quality Bureau (SWQB) Project Officer will ensure that copies of the approved QAPP and any subsequent revisions are distributed to all other project personnel listed in Table 1. All members of the distribution list who do not have signature authority to approve this QAPP will review the QAPP and sign the Acknowledgment Statement prior to initiating any work for this project. The Acknowledgment Statements can be signed in hard copy or electronically. The signed Acknowledgement Statements will be collected by the SWQB Project Officer and will be given to the QA Officer for filing with the original approved QAPP.

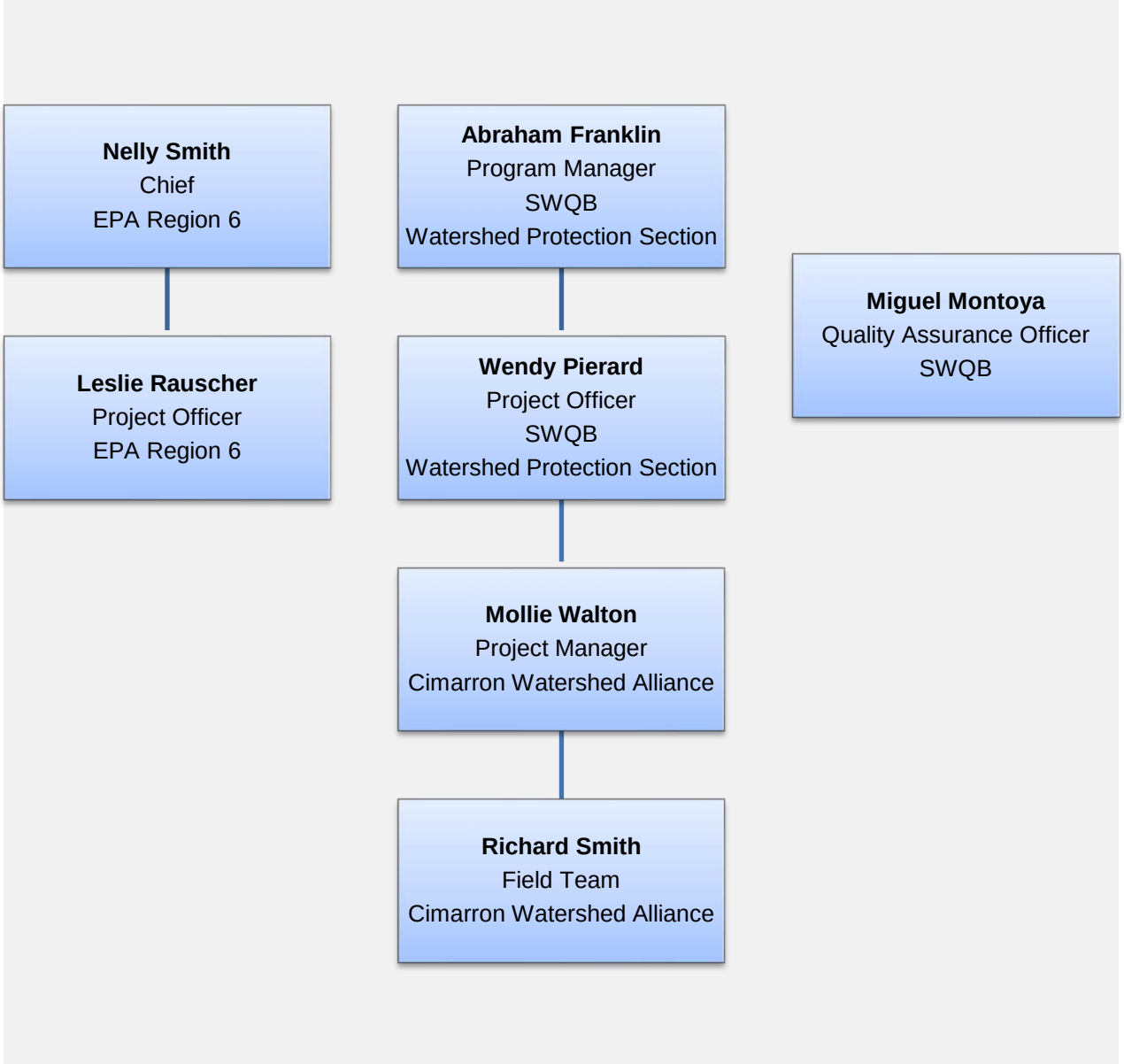
Table 1. Distribution List, Project Roles, and Responsibilities

Name	Organization	Title/Role	Responsibility	Contact Information
Abe Franklin	SWQB	Program Manager	Reviewing and approving QAPP, managing project personnel and resources	505-827-2793 Abraham.franklin@state.nm.us
Miguel Montoya	SWQB	QA Officer	Reviewing and approving QAPP	505-476-3794 Miguel.montoya@state.nm.us
Wendy Pierard	SWQB	Project Officer	Revising QAPP, distribution of QAPP, project reporting, coordinating with contractors, oversight of data collection, and EPA reporting.	505-476-3026 Wendy.Pierard@state.nm.us
Mollie Walton	Cimarron Watershed Alliance	Project Manager	Project oversight, prepare QAPP, project design and implementation, construction oversight, field monitoring, data collection and management, submittal of quarterly and final reports.	254-688-0348 walton.cwa@gmail.com
Richard Smith	Cimarron Watershed Alliance	Field Team	Field monitoring and data collection	662-312-1678 rcsmith3@gmail.com
Leslie Rauscher	Environmental Protection Agency (EPA)	EPA, Water Quality Protection Division, Reg. 6	Reviewing and approving QAPP	(214) 665-2773 Rauscher.Leslie@epa.gov
Nelly Smith	EPA	Chief, State and Tribal Programs Section, Reg. 6	Reviewing and approving QAPP	(214) 665-7109 Smith.Nelly@epa.gov

A.4 PROJECT ORGANIZATION

The SWQB Quality Management Plan (New Mexico Environment Department (NMED)/SWQB 2019) documents the independence of the Quality Assurance Officer (QAO) from this project. The QAO is responsible for maintaining the official approved QAPP. When changes affect the scope, implementation or assessment of the outcome, this QAPP will be revised to keep project information current. The Project Officer, with the assistance of the QAO, will determine the impact of any changes to the technical and quality objectives of the project. This QAPP will be reviewed annually by the Project Officer to determine the need for revision. Figure 1 presents the organizational structure for the North Ponil Restoration Project.

Figure 1. Organization Chart



A.5 PROJECT LOCATION

The Cimarron watershed is approximately 1,032 square miles in size and lies on the eastern slopes of the Sangre de Cristo Mountains within Colfax County (Figure 2). Elevations in the watershed range from approximately 12,000 feet (in the headwaters located in the Valle Vidal Unit of the Carson National Forest) to slightly less than 6,000 feet (at the Cimarron/Canadian River confluence near Springer, New Mexico). The hydrologic unit code (HUC) for the Cimarron Watershed is 11080002.

Vegetation distribution in the Cimarron River watershed generally varies with elevation. The western portion of the watershed is characterized by high mountain landscapes with subalpine and montane vegetation, including coniferous forests of Engelmann spruce, ponderosa pine, and Douglas fir as well as deciduous aspen stands The watershed also includes numerous riparian corridors. Vegetation in these riparian areas varies with elevation and land use but is generally characterized by alder, willow, cottonwood, and various herbaceous species (University of New Mexico, 2010). Ponil Creek is formed by three main tributaries: the North Ponil, the Middle Ponil, and the South Ponil Creeks.

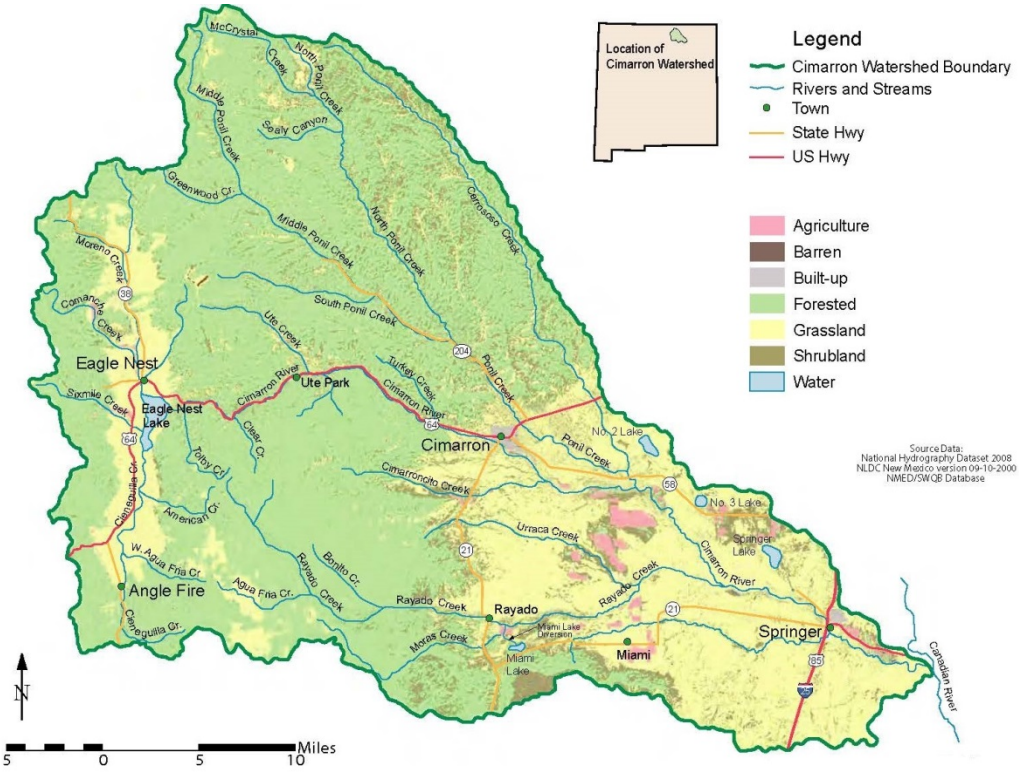


Figure 1. Cimarron Watershed within the state of New Mexico

The CWA has been managing a Clean Water Act section 319 grant primarily to address temperature exceedances in North Ponil Creek. Restoration treatments will also reduce sediment and lessen turbidity and nutrients within the creek. This project has focused on lowering the stream temperature, stabilization of stream banks, and the implementation of erosion control treatments. North Ponil Creek is a subwatershed of the Cimarron Watershed (Figure 3) in northern New Mexico.

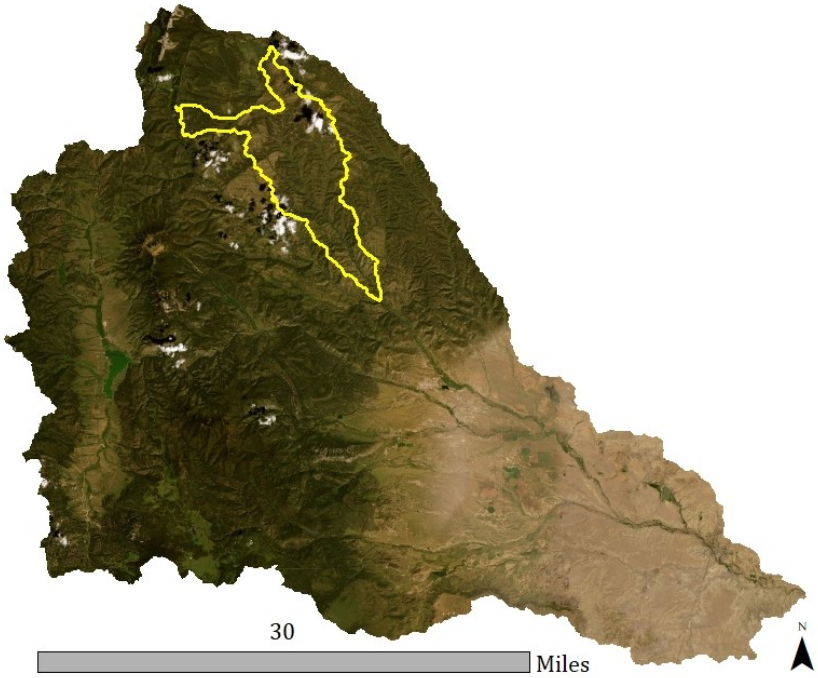


Figure 2. Location of the North Ponil Restoration Project

The project area is in the Outlet North Ponil Creek subwatershed (Figure 4). This area is dominated by forest land in high mountain landscapes. The reach of North Ponil Creek that will be treated under this project is the portion that runs through the Philmont Scout Ranch.

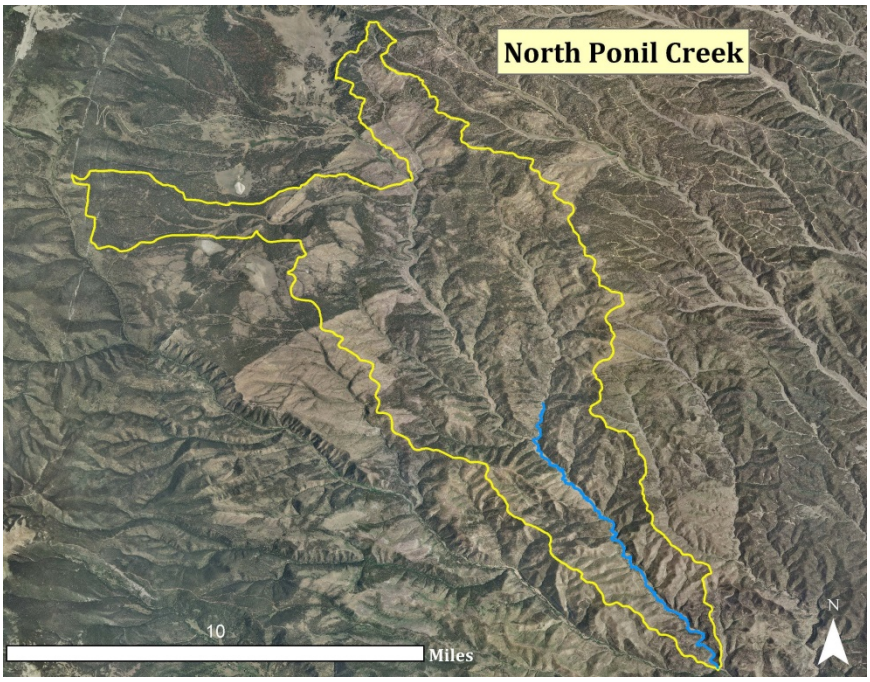


Figure 3. Project area location on North Ponil Creek

A.6 PROBLEM DEFINITION/BACKGROUND

This QAPP refers to the project as the *North Ponil Restoration Project."* The North Ponil Restoration Project is being managed by the Cimarron Watershed Alliance (CWA). The purpose of this QAPP is to support the Restoration of North Ponil Project in properly monitoring water quality and streambank stability changes due to restoration activities. Currently, North Ponil Creek does not support High Quality Coldwater Aquatic Life (HQCAL) and Primary Contact due to higher stream temperatures, turbidity, nutrients and E.coli according to the 2016-2018 State of New Mexico Clean Water Act Section 303(d)/305(b) Integrated Report (NMED/SWQB. 2016a)

Monitoring Station ID	WQS Citation	Assessment Unit ID	12-Digit HUC or Latitude and Longitude
North Ponil Restoration Project sites	20.6.4.309 NMAC	NM-2306.A_110	11080002

Background

North Ponil Creek through the reach owned by Philmont Scout Ranch is extremely incised, has steep eroding banks, and is likely continuing to down-cut due to historic and ongoing impacts from legacy logging and railroad operations, roads, historic overgrazing, and the catastrophic 2002 Ponil Complex Fire. Along the North Ponil Creek in the project area, there are 8.2 miles of road with 8 low water crossings (LWCs). All of these issues are contributing to the water quality impairments on the North Ponil Creek. In 2019, the CWA received a 319 Clean Water Act grant to address water quality impairments in North Ponil Creek. Philmont Scout Ranch (PSR) will work with the CWA to install in-stream restoration treatments and fix several low water crossings to address the temperature and turbidity impairments on North Ponil Creek through the PSR property.

Objective

Data collection will be conducted to determine the effectiveness of the restoration treatments by evaluating the change in channel geomorphology, bank stability, obligate riparian vegetation extent, riparian canopy cover, water temperature, and selected water quality indicators (dissolved oxygen and turbidity). Pre-treatment monitoring data collection activities will be conducted prior to implementation of the restoration treatment design and installation of Zeedyk and Rosgen Natural Channel Design structures (Zeedyk et al 2014 and Rosgen 1996). Post treatment monitoring data and collection activities will be used to evaluate the effectiveness of the project.

Bankfull width at LWCs will be reduced by 20%, and mean depth will be reduced to match natural channel conditions of the North Ponil. A reduction of sediment entering the creek as well as the

sediment capture provided by the 100 one rock dams will reduce turbidity. The goal for the North Ponil for Total Suspended Solids (TSS)(Turbidity) is 5.4 lbs/per day though the current load is 9.5 lbs/day. A reduction of 0.25 lbs per day could be achieved through the construction of 100 in-stream structures. The goal of reducing stream temperature by 0.1° C at the downstream end of the project is comparable to previous restoration project goals on Ponil Creek and Cieneguilla Creek. Canopy density monitoring will also be performed within the project area along the North Ponil, but an increase in canopy coverage will not be a goal of this project since the project does not propose any exclosures, riparian plantings, or other grazing related treatments.

A.7 PROJECT/TASK DESCRIPTION

Description

Along the North Ponil Creek in the project area, there are 8.2 miles of road with low water crossings. Eight, low water road crossings will be upgraded to reduce their contributions to the temperature and turbidity problem. Installation of rolling dips on either side of LWCs and stabilizing the LWCs will decrease the amount of sediment contributed by each low water crossing to the North Ponil. At least one hundred, in-stream, restoration structures will be installed to help stabilize the stream channel and banks, reduce channel width, increase the health of riparian wetland vegetation, reduce down-cutting, capture in-stream sediment, and raise the channel bed. The construction of in-stream rock structures along North Ponil Creek will help to reduce sediment and turbidity and reduce stream temperature.

Schedule

Monitoring activities will begin in the summer of 2020, or as soon as the QAPP has been approved. Pre-treatment data will be collected early in the 2020 field season and post treatment data will be collected in July and August of 2023 (Table 2). Monitoring data collection will include geomorphic cross-sections and pebble counts, Bank Erosion Hazard Index (BEHI) and Near Bank Stress (NBS) ratings, wetland vegetation greenline extent, canopy density monitoring, water temperature, water quality data (dissolved oxygen and turbidity) and repeat photography. All collection efforts will be conducted both pre and post restoration treatment installation.

Table 2. Summary of monitoring tasks, products, responsible party, and timeline

Task	Product	Responsible Party	Timeline
Geomorphic Surveys	Geomorphic cross sections and pebble counts	CWA	May 2020 August 2023
Streambank Stability Ratings	Bank Erosion Hazard Index (BEHI) and Near Bank Stress (NBS) ratings	CWA	Concurrent with Geomorphic Surveys
Wetland Vegetation Greenline Survey	Extent of wetland obligate vegetation on geomorphic cross section	CWA	Concurrent with Geomorphic Survey
Canopy Density Monitoring	Percent stream shading (canopy density) data	CWA	Concurrent with Geomorphic Survey

Water Temperature Loggers	Water temperature data from three locations	CWA	Field Seasons (May 2020-October 2023) each project year
Water Quality Measurements	Stream turbidity and dissolved oxygen (DO) data at the fourteen geomorphic cross section locations	CWA	Concurrent with Geomorphic Surveys
Photographic Monitoring	Repeat photography pre and post project	CWA	May 2020, August 2023

Monitoring Location Selection Criteria

Cross section locations include each of the eight LWCs. Six, cross section locations will be determined after the design has been approved by NMED. Cross section locations will be chosen at three locations where bank stability is a problem and at three locations where treatments will be placed, but there is not significant bank erosion. Streambank stability rating, pebble counts, and greenline surveys will be conducted at these six locations along with canopy density monitoring, water quality readings and repeat photography. These same reading will be taken at the 8 LWCs except for pebble counts and BEHI and NBS ratings. A temperature logger will be placed upstream of the treatment reach, near the middle, and at the downstream end of the treated reach of North Ponil Creek (Figure 5).

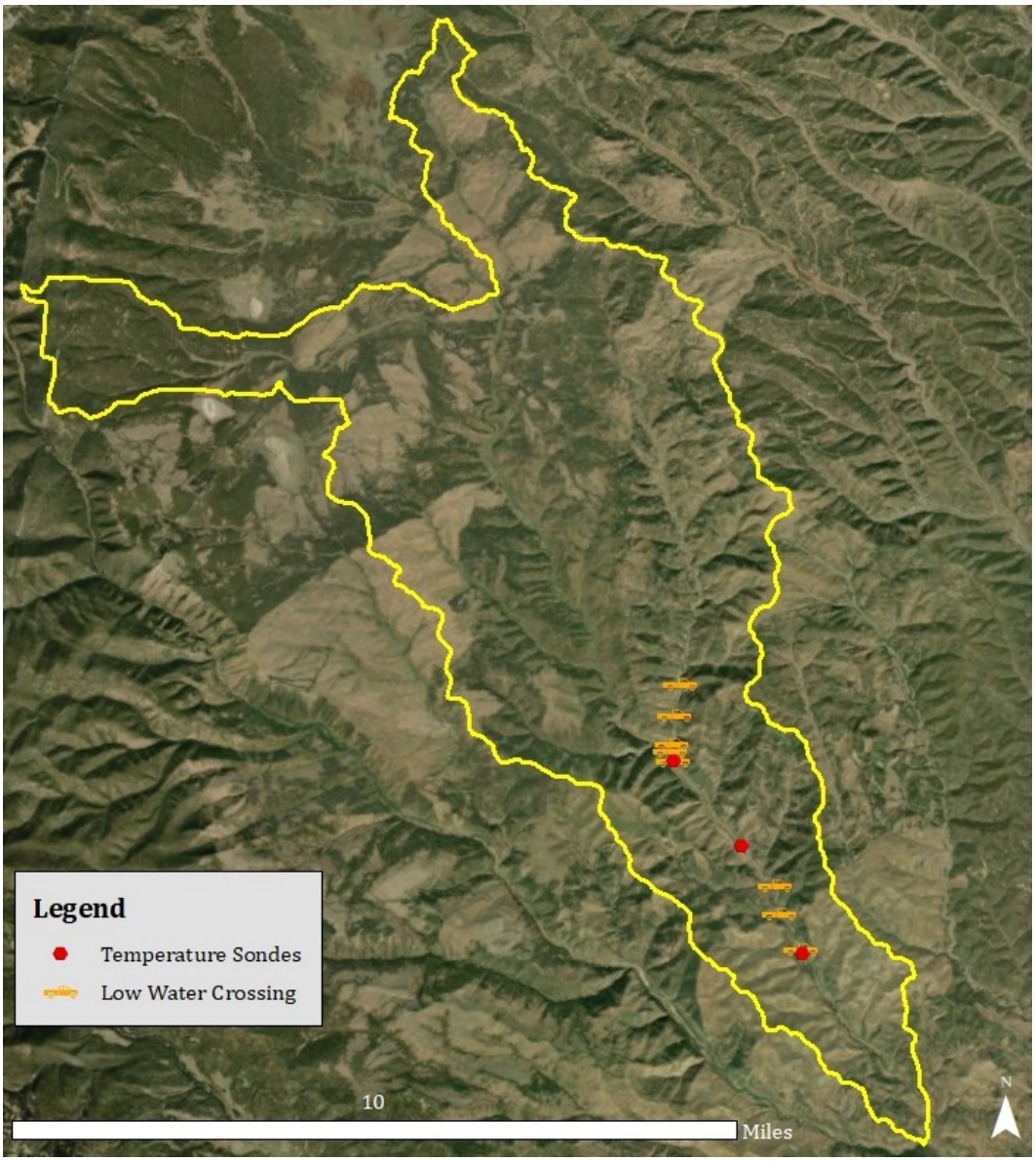


Figure 4. Project Area with Monitoring Locations

Restoration Activities

Along the North Ponil Creek in the project area, there are 8.2 miles of road with LWCs. Eight, low water road crossings will be upgraded to reduce their contributions to the temperature and turbidity problem. Installation of rolling dips on either side of LWCs and stabilizing the LWCs will decrease the amount of sediment contributed by each LWC to the North Ponil. At least one hundred, in-stream restoration structures will be installed to help stabilize the stream channel and banks, reduce channel width, increase the health of riparian wetland vegetation and help establish a low flow channel, reduce down-cutting, capture in-stream sediment, and raise the channel bed.

A.8 Quality Objectives and Criteria for Measurement Data

Question/Decision

The baseline data collection and monitoring components of the North Ponil Restoration Project are intended to answer the following questions: Have restoration treatments improved water quality and bank stability?

Stated as a decision: The information gathered by the North Ponil Restoration Project will be used to decide whether the restoration treatments in and along the North Ponil Creek have improved water quality and bank stability.

Data Quality Objective (DQO)

The quality of the data will be adequate to provide a high level of confidence in determining improved bank stability, a reduction in sediment entering the creek, and cooler water temperatures in the *Restoration of North Ponil Project.*

Measurement Quality Objectives

The measurement quality objectives will be sufficient to achieve the Data Quality Objectives (DQO). Water temperature measurements will reflect the accuracy and precision of the instruments, stream geomorphology (cross sections) will reflect the manufactures specifications for accuracy of the survey equipment (CST/berger ALH), summarized in Table 3.

The anticipated accuracy and precision for BEHI, NBS, pebble counts, and canopy coverage measurements are also provided in Table 3. Measurements on bank height and other features will be collected to the nearest 0.1 feet and are adequate to accurately calculate the index. BEHI and NBS components dependent on visual estimation (percent vegetative cover and protection, etc.) are susceptible to observer bias, but will be conducted by experienced professionals.

Pebble counts are measured in millimeters using a ruler following the Wolman (1954) method to obtain a representative sample for each pebble count survey. The CWA has used spherical densiometers for canopy cover estimates in previous projects and are experienced in use of the instruments. Canopy coverage estimates using a spherical densiometer range from 0- 10% deviation from the true value (Korhonen et al. 2006).

Data Quality Indicators

The measurement quality objectives will be sufficient to achieve the DQO and will be in conformance with those listed in the SWQB's QAPP. The Data Quality Indicators (DQI) listed in the SWQB's QAPP and applicable to the data collected for this project are precision, bias, accuracy, representativeness, comparability, completeness, and sensitivity (Table 3).

Table 3. Data Quality Indicators

DQI	Determination Methodologies

Precision	The basis for determining precision will be the comparison of photo-documentation of prior and post project construction activity images. Wetland vegetation greenline transects (vegetation monitoring) and geomorphic cross sections will all be monumented for repeat sampling events for the life of project. Precision will also be ensured by consistently assigning the same people the responsibilities of collecting, recording and analyzing data with the expert assessments of members of the SWQB project team.
Bias	To reduce the systematic or persistent distortion of any measurement process, bias will be minimized by using professional and experienced staff to collect and analyze data.
Accuracy	The basis for determining accuracy will be the comparison of photo-documentation, measurements obtained from predetermined monument locations, the recording of GPS location data for each sampling event as well as through the expert assessments of members of the SWQB project team.
Representative	Data collection will be completed at multiple sites within the North Ponil Creek Project site that are representative of the watershed project area.
Comparability	This project will collect new data where no data is available for comparison. However, methods for data collection are standardized and reproducible using procedures identified in this QAPP. Vegetation, hydrological and geomorphic monitoring employ established methods that can be compared to other data collected with same methods.
Completeness	Completeness will be achieved by following the sampling design and methods within this QAPP required to obtain useable data that will enable the proper evaluation of project success or failure using the expert assessments of members of the SWQB project team. Complete survey data will be ensured by collecting all of the required data for each sampling method and verifying before leaving the field.
Sensitivity	Fiberglass tapes and rulers do not have sensitivity. Visual estimates also have no sensitivity. The CST/berger ALH laser level has +/-0.05mm/m sensitivity. The AquaTROLL 500 multimeter sonde has a sensitivity of 0.01°C for water temperature, 0.01 mg/L for dissolved oxygen, and 0.01 NTU for turbidity. The HOBO Water Temp Pro v2 has a sensitivity of ±0.2°C.

A.9 Special Training/Certification

This project will be primarily implemented by Mollie Walton of the CWA in accordance with procedures identified in SOPs referenced in this QAPP. Data collection and monitoring for this project will be implemented by the CWA with technical assistance and oversight from the SWQB Project Officer. Any individual conducting work for the project will review this QAPP and sign the acknowledgment statement prior to initiating any work for this project. The singed acknowledgment statements will be kept on file with original QAPP by the QAO.

No special training or certification will be required of the cooperator, the Cimarron Watershed Alliance. Their staff includes a restoration ecologist with graduate level training and decades of natural resource data collection experience. Ricard Smith is a Natural Resource Technician and has many years of

experience in monitoring creek restoration projects. Their qualifications and experience lend confidence to the estimated accuracy and precision of the data being collected. The SWQB Project Officer will provide oversight to ensure that data collection is consistent with the current SWQB QAPP and referenced SOPs.

A.10 Documents and Records

The SWQB Project Officer will make copies of this approved QAPP and any subsequent revisions available to all individuals on the distribution list who do not have signature authority for approving the QAPP. When changes affect the scope, implementation, or assessment of the outcome, this QAPP will be revised to keep project information current. The SWQB Project Officer, with the assistance of the QAO, will determine the effects of any changes to the scope, implementation, or assessment of the outcome on the technical and quality objectives of the project. This Project Plan will be reviewed annually by the SWQB Project Officer to determine the need for revision.

Project documents include this QAPP, field notebooks, calibration records, validation and verification records, recorded field data, records of analytical data in hard copy or in electronic form, and QC records. Also included are project interim and final reports. Data captured on a GPS, camera, smart phone, tablet, or laptop will be downloaded to a CWA computer and an external hard drive. Copies will be made of all data and stored separately from the original data.

All digital project data will be kept in a project file on the Project Manager's computer and on a separate external backup hard drive at the Natural Resources Department at Vermejo Park Ranch. Hard copy project documents will be kept in a project folder in an office binder at the same location. All hard copy documents will be digitized and stored on the Project Manager's computer and backup on a hard drive (Table 4). Copies of the data will be distributed by the CWA to NMED SWQB Project Officer after each filed season, typically at the end of December.

Table 4. Data Records for the Project

Document	Type of Form	Storage Location	Field Sheet Used
QAPP	Electronic (.doc) & Hard Copy	Natural Resource Department, Vermejo Park Ranch	EPA Requirements for Quality Assurance Project Plan. EPA QA/R-5. Located at: https://www.epa.gov/sites/production/files/2016-06/documents/r5-final_0.pdf
Thermograph Deployment Form	Hard Copy	Natural Resource Department, Vermejo Park Ranch	Thermograph Deployment Form. Located at: https://www.env.nm.gov/surface-water-quality/
Temperature Data	Electronic Excel Files and HOBOware	Natural Resource Department, Vermejo Park	Thermograph Deployment Form. Located at https://www.env.nm.gov/surface-water-quality/sop/

	files	Ranch	
Temperature Effectiveness Analysis	Electronic Excel Macro files	Natural Resource Department, Vermejo Park Ranch	ANCOVA & Thermograph Excel forms. Available from Dan Guevara, NMED SWQB.
Physical Habitat Field sheets (percent canopy cover)	Electronic (.xls) & Hard Copy	Natural Resource Department, Vermejo Park Ranch	Physical Habitat Field Forms. Located at https://www.env.nm.gov/surface-water-quality/sop/
BEHI and NBS	Electronic (.xls) & Hard Copy	Natural Resource Department, Vermejo Park Ranch	Bank Erosion Summary Table with BEHI and NBS Forms Template
Cross Section, Wetland Vegetation Greenline, and Pebble Count Data	Electronic (.xls) & Hard Copy	Natural Resource Department, Vermejo Park Ranch	Reference Reach Survey (STREAM Module, Mecklenburg), Greenline added to cross section data form
Sonde Deployment Form	Electronic and/or Hard Copy	Natural Resource Department, Vermejo Park Ranch	Sonde Deployment form. Located at https://www.env.nm.gov/surface-water-quality/sop/
Sonde Calibration Worksheet	Electronic and/or Hard Copy	Natural Resource Department, Vermejo Park Ranch	SWQB calibration worksheet under Related SOP Forms for SOP 6.1.
Sonde Data	Electronic (.xls)	Natural Resource Department, Vermejo Park Ranch	NA
Photos	Electronic (.jpg)	Natural Resource Department, Vermejo Park Ranch	Permanent Phot Point Record. Appendix I *"Let the Water do the Work"*
Interim and Final Reports	Electronic (.doc) & Hard Copy	Natural Resource Department, Vermejo Park Ranch	NA

GROUP B: DATA GENERATION AND ACQUISITION

B.1 SAMPLING DESIGN

The mapping and identification of treatment locations, cross sections and photo points will be mapped using a GPS unit. Geomorphic assessment cross sections will be recorded at each of the eight LWC (minus pebble counts) and at six locations (including pebble counts) on the North Ponil Creek where in-stream structures are to be installed. The laser level model and sensitivity are in recorded in Table 3. A fiberglass reel measuring tape will be used for cross sections. Measurements are recorded to a tenth of a foot. Geomorphic cross section transects and associated pebble counts will be used to quantify and assess the geomorphic setting of the landscape and stream channel characteristics to evaluate and channel or sediment changes over time.

Bank Erosion Hazard Index (BEHI) and Near Bank Stress (NBS) ratings will be conducted at each of the six cross sections pre and post treatment to document any changes in bank stability that will affect sediment entering the North Ponil Creek (Rosgen 1996, 2001a, 2001b, 2009).

Rewetted riparian wetland acres will be quantitatively determined using greenline wetland vegetation transects as conducted in accordance with Monitoring the Vegetation Resources in Riparian Areas (Winward 2000). The survey will be used to evaluate project area vegetation changes due to increases or decreases of wetland vegetation associated with water redistribution or bank soil moisture content.

Densitometer Stream canopy cover will be collected following procedures outlined under the section pertaining to Percent Canopy Cover in SWQB's SOP for Physical habitat Measurements (SOP 5.0).

HOBO® Water Temp Pro v2 temperature data loggers will be deployed in three locations on North Ponil Creek. The CWA will download and compile data. Deployment methodology follows SWQB's Standard Operating Procedure (SOP) for Thermographs SOP 6.3. The SWQB Thermograph Deployment form will be utilized to record deployment of temperature data loggers.

Water quality data (temperature, dissolved oxygen and turbidity) will be collected as instantaneous readings from North Ponil Creek prior to collecting geomorphic data. An In Situ AquaTROLL 500 sonde will be used to collect the data.

The photo-documentation monitoring will be performed according to protocol established in "Let the Water Do the Work", Appendix I, Outline for Photographic Monitoring Plan (Zeedyk, et al. 2014) will be used. Photo documentation will be used to document visual changes in vegetation and water distribution on the landscape over time. Changes over time will demonstrate the effectiveness of the restoration activities such as installation of in-stream baffles, one rock dams, and boulder cross vanes. Table 5 summarizes the monitoring plan for the North Ponil Restoration Project.

Table 5. Project Monitoring Specifics

Responsible Party	Monitoring	Location	Frequency
CWA	Geomorphic assessment cross sections	8 LWCs and 6 cross sections	Summer 2020, Summer 2023

CWA	Wolman pebble counts	6 cross sections	Summer 2020, Summer 2023
CWA	BEHI and NBS ratings	6 cross sections	Summer 2020, Summer 2023
CWA	Wetland vegetation greenline	6 cross sections	Summer 2020, Summer 2023
CWA	Canopy cover	8 LWCs and 6 cross sections	Summer 2020, Summer 2023
CWA	Water temperature	Top, middle and bottom of treated reach	Summer 2020, 2021, 2022 and 2023
CWA	Water temperature grab sample	8 LWCs and 6 cross sections	Summer 2020, Summer 2023
CWA	Dissolved oxygen grab sample	8 LWCs and 6 cross sections	Summer 2020, Summer 2023
CWA	Turbidity grab sample	8 LWCs and 6 cross sections	Summer 2020, Summer 2023

B.2 SAMPLING METHODS

Physical Habitat data (canopy cover) will be conducted in accordance with SWQB SOP 5.0. *Physical Habitat Measurements* (NMED/SWQB 2019b). All applicable sections of SWQB SOP 5.0 will be adhered to during data collection for percent canopy.

Cross sections and BEHI and NBS ratings will be conducted according to Rosgen's River Stability Field Guide methodology utilizing the River Stability Forms and Worksheets.

Greenline vegetation surveys will be conducted in accordance with *Monitoring the Vegetation Resources in Riparian Areas* (Winward 2000). Greenline vegetation surveys will follow procedures identified in the Greenline Composition section. A vegetation identification handbook will be carried by field team for identification of vegetation community type classification.

Estimation of sediment loading from eroding banks based on field indicators and measurements (i.e., BEHI modeling) will be done in accordance with the instructions provided in the Watershed Assessment of River Stability and Sediment Supply (WARSSS) (Rosgen 2009).

Hobo Water Temp pro v2, U22-001 loggers will be deployed at monitoring locations in accordance with the SWQB SOP 6.3 *Temperature Data loggers* (NMED/SWQB 2019a). Temperature data logger deployment will follow all applicable sections of the SWQB SOP for *Temperature Data loggers* which includes the QAQC section.

The CWA will collect instantaneous measurements with the AquaTROLL 500 sonde at all monitoring sites in accordance with the SWQB SOP 6.2, *Sonde Deployment* (NMED/SWQB. 2018b). Instantaneous measurements collected during sonde deployment will occur before each cross section is recorded. The sonde will provide instantaneous measurement of the following field parameters during sampling events: temperature, dissolved oxygen, and turbidity.

Photographic documentation will be conducted using the protocols identified in *Let the Water Do the Work* (Zeedyk, et al, 2009) Appendix I, Outline for Photographic Monitoring Plan. Photo points will be recorded using Permanent Photo Point-Record-Initial Take (Form 1).

B.3 Sample Handling and Custody

There are no plans to collect samples for laboratory analysis; therefore, there are no handling requirements.

B.4 Analytical Methods

There are no plans to collect samples. No analytical methods are needed.

B.5 Quality Control

Quality control (QC) activities are technical activities performed on a routine basis to quantify the variability that is inherent to any environmental data measurement activity. The purpose for conducting QC activities is to understand and incorporate the effects the variability may have in the decision-making process. Additionally, the results obtained from the QC analysis, or data quality assessment, may identify areas where the variability can be reduced or eliminated in future data collection efforts, thereby improving the overall quality of the project being implemented.

Quality Control mechanisms are implemented as described under the Quality Objectives and Criteria for Measurement Data as well as the sampling methodologies identified under this QAPP. Additional Quality Control includes the professional expertise of the personnel working under this project.

The CWA field team has many years of experience working on stream restoration projects and have successfully completed many season of monitoring.

Geomorphic surveys will be completed using a laser level. Cross section start and end locations will be marked with rebar and metal caps. Data collected from before and after restoration treatments will be collected by the same field team and will correspond to the same locations on the cross section tape.

Field team members have been trained in BEHI, NBS, and Wolman pebble count methodology and are experienced in these monitoring methodologies.

Wetland vegetation greenline extent recording are conducted by an experienced scientist with many years of experience in vegetation monitoring.

Canopy cover readings using a spherical densitometer will be collected at the same locations each field season.

Temperature logger placement follows NMED SOP 6.3 Thermographs.

Water Quality sensors will be checked against a distilled water blank before each grab sample.

Repeat photography will be conducted from the same location each field season documented by a GPS location.

B.6 Instrument/Equipment Testing, Inspection and Maintenance

The HOBO temperature loggers will be tested in for accuracy and to confirm that they are still waterproof at the beginning of each field season by the CWA. All other equipment will be inspected for damage prior to each use.

B.7 Instrument/Equipment Calibration and Frequency

It should be possible to show that all data was collected with monitoring devices that can be shown to have been properly calibrated. The laser level will be visually inspected before data are collected. Spherical densiometers do not require calibration. For this project, specific calibration requirements apply to HOBO temperature data loggers and the In Situ AquaTROLL 500 sensors. The calibration of HOBO temperature loggers will be checked annually (before deployment and after retrieval) using the methodology described in the SWQB SOP 6.3 for Thermographs. Temperature will be checked with a National Institute of Standards and Technology (NIST) certified thermometer The In Situ AquaTroll 500 sensors will be calibrated according to SWQB SOP 6.1 Sonde Calibration and Maintenance. Calibration of the AquaTROLL 500 dissolved oxygen sensor will be completed daily before field sampling (at first sample site) and calibration verification will be completed after all instantaneous measurements have been recorded for the day. The Barometric pressure and elevation will be recorded on calibration worksheet during calibration and calibration verification of DO sensor. Turbidity will be calibrated with a two-point calibration and a calibration verification will be completed per SOP 6.1. All calibration of the AquaTroll 500 will be completed according to SWQB SOP 6.1 Sonde Calibration and Maintenance . Documentation of calibration and calibration verification will be recorded on the SWQB Sonde Calibration Worksheet and will be maintained by Mollie Walton or Richard Smith.

B.8 Inspection Inspection/Acceptance for Supplies and Consumables

The turbidity standards will be replaced when expired.

B.9 Non-direct Measurements

Existing aerial and satellite imagery of the reach of North Ponil Creek in the project area will be used to aid in determining structure placement. Imagery is available through base maps available in ersi software and Google Earth. Specification for ersi imagery and Google Earth imagery are available at the following links.

esri.com/software/open

https://support.google.com/mapsdata/answer/6261838?hl=en

No non-direct measurements used during the course of this project will affect the quality of data related to this project.

B.10 Data Management

The CWA will be responsible for data management. All data will be converted to electronic format, stored and backed up by Mollie Walton of the CWA. Computer hard drives are backed up weekly or will

be backed up on external hard drives, respectively. Hard copies of field sheets will be maintained in a project binder organized by assessment and date and stored in a filing cabinet at in the office of the Natural Resources Division of Vermejo Park Ranch.

Data will be sent to the SWQB Project Officer by the end of each field season by Mollie Walton, typically by the end of December. Upon receiving data, the SWQB Project will store data on SWQB network drive. The SWQB network drive is backed up daily and maintained by the NMED Office of Information Technology. Electronic data files will be stored on the SWQB network drive in accordance with 1.21.2 NMAC, *Retention and Disposition of Public Records.*

GROUP C: ASSESSMENT AND OVERSIGHT

C.1 Assessment and Response Actions

The SWQB Project Officer will provide project oversight by periodically assisting with and/or reviewing data collection efforts. A review of the baseline data collection and monitoring efforts by the SWQB Project Officer will take place at the end of each monitoring season. The SWQB Project Officer will assess project progress to ensure the QAPP is being implemented, including periodic audits by the QAO, as needed. Any problems encountered during the course of this project will be immediately reported to the SWQB Project Officer who will consult with appropriate individuals to determine appropriate action. Should the corrective action impact the project or data quality, the SWQB Project Officer will alert the QAO. If it is discovered that monitoring methodologies must deviate from the approved QAPP, a revised QAPP must be approved before work can be continued. All problems and adjustments to the project plan will be documented in the project file and included in the final report.

C.2 Reports to Management

An annual photo monitoring report will be submitted by the CWA to the SWQB Project Officer and will include any available raw data. Printouts, status reports or special reports for SWQB or EPA will be prepared upon request. The final monitoring report will be submitted to the SWQB Project Officer by September 2023. The SWQB Project Officer will be responsible for submitting the final project deliverables to EPA through their Grants Reporting Tracking System.

GROUP D: DATA VALIDATION AND USABILITY

D.1 Data Review, Verification and Validation

Data will be reviewed by the Project Manager for erroneous data, incomplete data and transcription errors prior to demobilization from the field site. Data will be considered usable if the requirements of this QAPP were followed and the data is within acceptable range limits as defined under this QAPP. Data that appears incomplete or questionable for the parameter will be flagged for review. Flagged data will be discussed with the SWQB Project Officer to determine the potential cause and usability. If a reasonable justification for use of the data cannot be attained, those data will be not used in analysis

and implementation of activities listed under this QAPP unless the data can be recollected and assessed for usability.

Temperature data collected by the HOBO® Water Temp Pro v2 temperature data loggers will be analyzed and truncated according to the SWQB's Long Term Deployment (Temperature loggers and Sondes) Data Quality Assurance and SQUID Offload Instructions (SWQB SOP 6.4).

D.2 Validation and Verification Methods

The CWA will ensure that valid and representative data are acquired. Verification of field sampling and analytical results will be performed by the CWA in accordance with the SWQB SOP 15.0 for *Data Verification and Validation.*

Verification issues include the completeness of the record, and verification of calibration. Validation issues include the review of the data for anomalous data points and removal of data points based on reasonable explanation.

D.3 Reconciliation with User Requirements

The user requirement is a restatement of the data quality objective: The quality of the data will be adequate to provide a high level of confidence in determining whether the *North Ponil Restoration Project* is meeting the project goals, as stated in the approved scope of work.

If the project's results do not meet this requirement, then additional monitoring may be necessary to fill in data, which may include an extension of the monitoring period to measure effects that were not apparent during the project period.

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ACKNOWLEDGEMENT STATEMENT

New Mexico Environment Department Surface Water Quality

North Ponil Restoration Project
Quality Assurance Project Plan Acknowledgement Statement

This is to acknowledge that I have received a copy (in hard copy or electronic format) of the North Ponil Restoration Project *Quality Assurance Project Plan*.

As indicated by my signature below, I understand and acknowledge that it is my responsibility to read, understand, become familiar with and comply with the information provided in the document to the best of my ability.

_____
Signature

_____
Name (Please Print)

_____
Date

Return to SWQB Project Officer, Wendy Pierard